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(54) Reducing collision damage in vehicles

(57) A deflector block 18 is attached to the engine 11 in close proximity to the end of a brake master cylinder 16, and has an inclined surface 22 at an angle 'A' relative to the longitudinal axis L-L of the master cylinder 16. During a frontal impact the engine 11 and the deflector block 18 are moved rearwardly bringing the inclined surface 22 into contact with the master cylinder 16. The contact between the master cylinder 16 and the inclined surface 22 results in the master cylinder 16 being deflected laterally rather than it being displaced longitudinally. The risk of the master cylinder 16 penetrating a passenger compartment of the motor vehicle 10 is thereby reduced.

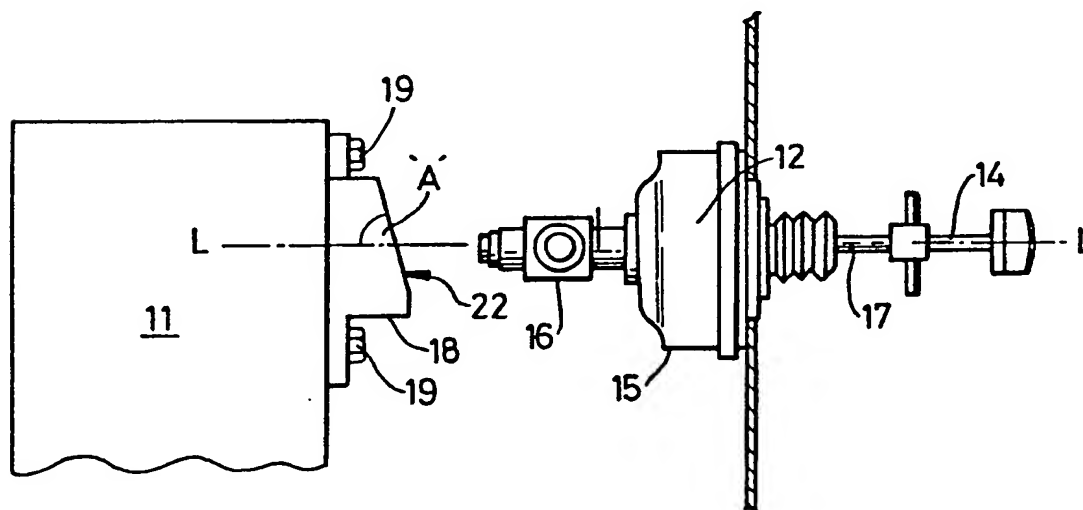


Fig. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

GB 2 230 493 A

1/2

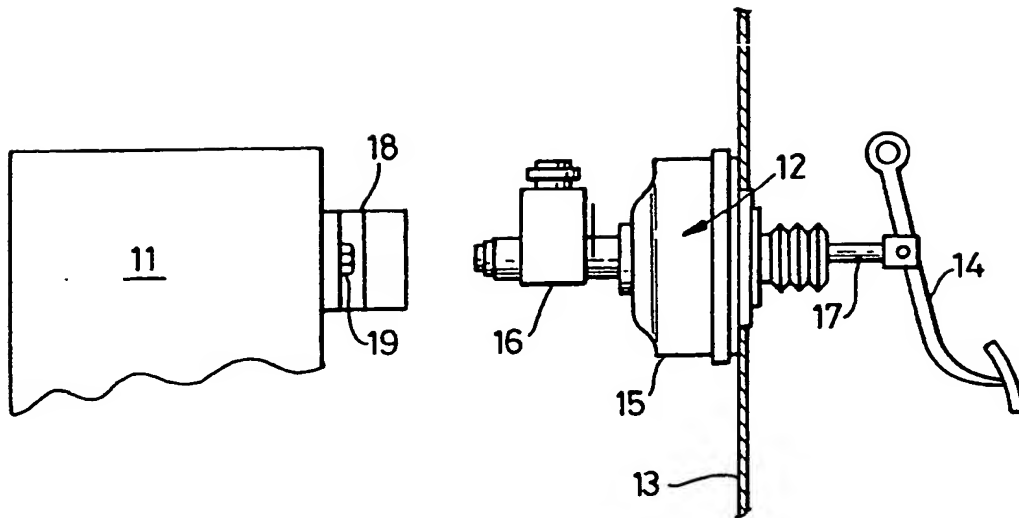


Fig. 1

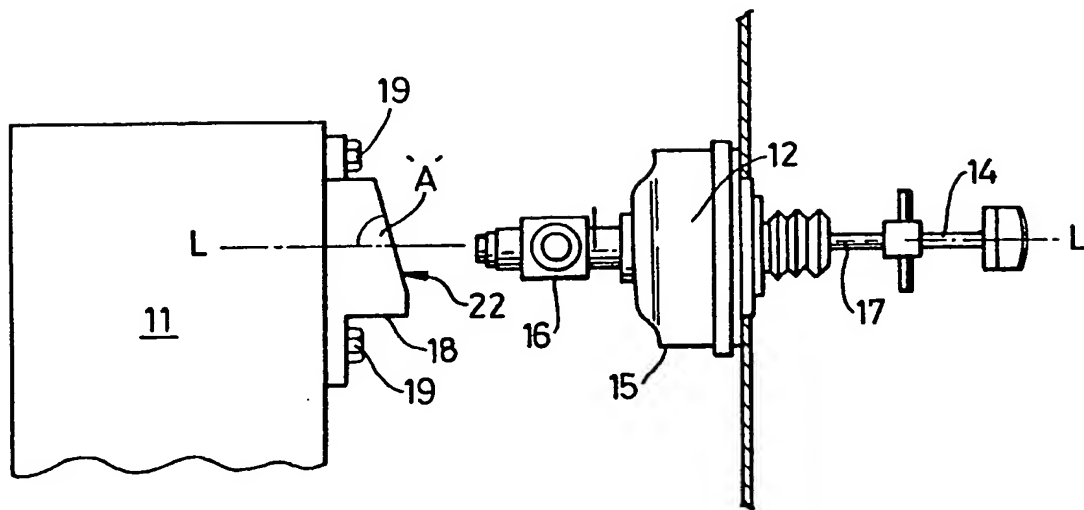


Fig. 2

2/2

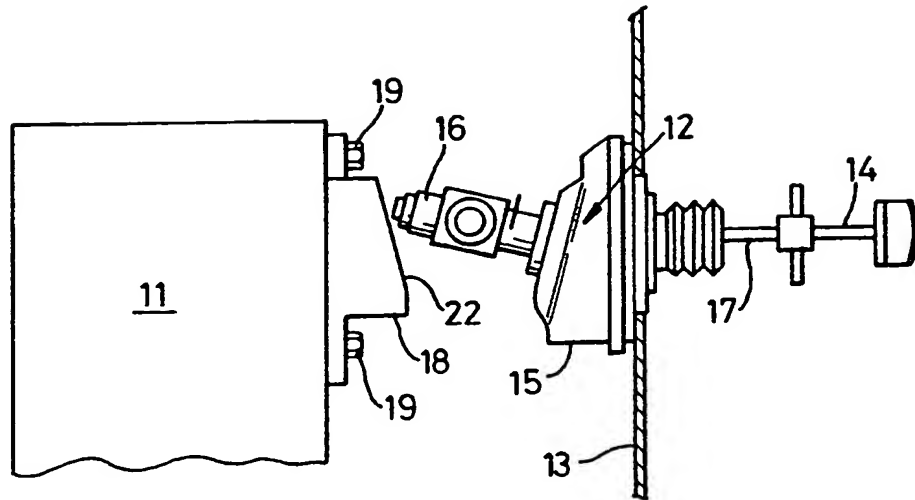


Fig. 3

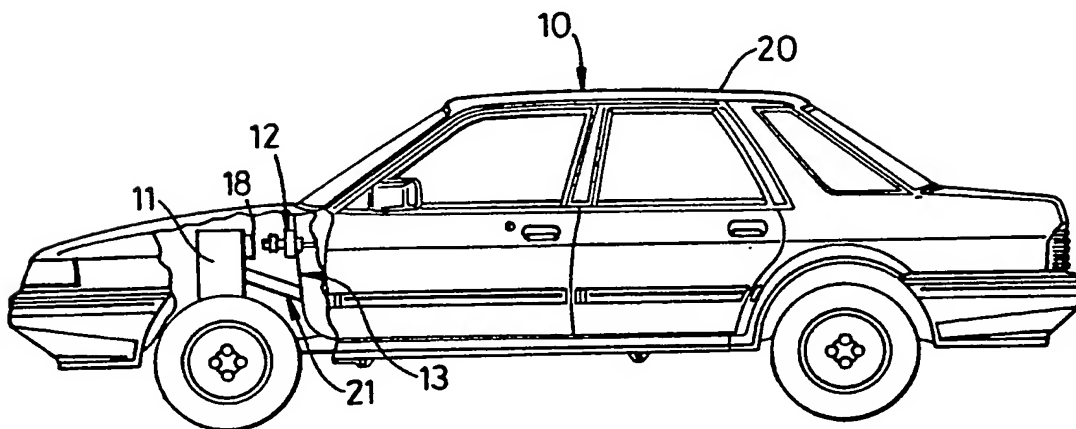


Fig. 4

A MOTOR VEHICLE

This invention relates to a motor vehicle.

It is a problem particularly with small motor vehicles that during a severe frontal impact of the motor vehicle the engine of the vehicle is moved rearwardly and impinges upon other components of the vehicle such as the master cylinder for the braking circuit.

Such master cylinders are normally very rigid in the longitudinal direction and therefore tend to be axially displaced by the contact with the rearwardly moving engine.

Often such axial displacement results in the master cylinder penetrating the passenger compartment of the vehicle or results in deformation of the mounting structure associated with the brake pedal assembly.

Such deformation can lead to the increased intrusion of the steering column into the passenger compartment and possible injury or entrapment of the vehicle drivers foot by deformation of part of the brake pedal assembly.

It is an object of this invention to reduce the effect of such rearward engine movement.

According to the invention there is provided a motor vehicle comprising a body, an engine mounted on said body, an elongate hydraulic master cylinder mounted on said body adjacent to the engine wherein the engine has an inclined surface facing the master cylinder for contact therewith during a frontal impact of the vehicle of sufficient severity to produce rearward displacement of the engine.

The inclined surface may be on a deflector block attached to the engine.

The brake master cylinder may be deflected laterally by contact with the inclined surface.

Preferably, the brake master cylinder may include a thin walled vacuum reservoir which is buckled by the lateral deflection of the master cylinder.

The invention will now be described by way of example with reference to the accompanying drawing of which:-

Figure 1: is a side view showing part of a motor vehicle according to the invention;

Figure 2; is a plan view showing part of a motor vehicle according to the invention;

Figure 3; is a plan view similar to that of Figure 2 but showing the effect of a rearward engine movement;
Figure 4; is a cutaway side view of a motor vehicle according to the invention.

With reference to Figures 1 to 4 there is shown a motor vehicle 10 having a body 20, an engine 11 and a brake servo 12.

The brake servo 12 comprises an elongate master cylinder 16, a thin walled vacuum reservoir 15 connected to a structural part of the body 20 in the form of a bulkhead or firewall 13 and a pushrod 17 to connect the master cylinder 16 to a brake pedal 14.

The engine 11 is supported on the body 20 by means of an engine mounting 21.

A deflector block 18 is fastened to the rear face of the engine by means of securing bolts 19.

The deflector block 18 has an inclined surface 22 for contact with an end of the master cylinder 16. The surface of the inclined surface 22 is at an angle 'A' of between 5 and 70° with respect to the longitudinal axis L-L of the master cylinder.

Operation of the invention is as follows.

When the motor vehicle 10 is operated normally there is a clearance between the inclined surface 22 and the end of the master cylinder 16 of sufficient magnitude to ensure that no contact can occur therebetween due to rocking of the engine 11 on its mounting 21. When the motor vehicle 10 is involved in a frontal impact of sufficient severity the engine 11 is moved rearwardly bringing the inclined surface 22 into contact with the master cylinder 16.

Because of the angle of the inclined surface 22 relative to the longitudinal axis of the master cylinder 16 a sideways loading is applied to the master cylinder 16 causing it to be laterally deflected.

The lateral deflection of the master cylinder 16 produces buckling of the vacuum reservoir 15 thereby accommodating the rearward movement of the engine 11. The rearward movement of the engine 11 does not therefore in this case result in the master cylinder 16 being forced rearwardly to pierce the bulkhead 13, thereby displacing the pushrod 17 and the brake pedal 14.

Although, the invention has been described in relation to a brake vacuum servo master cylinder in which the vacuum reservoir is buckled to accommodate the lateral movement of the master cylinder it could be just as advantageously employed in the case of a simple brake master cylinder having no vacuum reservoir.

In such a case the master cylinder itself could be weakened in the transverse direction thereby permitting it to fracture when subjected to a lateral load. Alternatively, the mounting of the master cylinder to the bulkhead could be arranged to distort or break when the master cylinder is subjected to a lateral load.

CLAIMS

1. A motor vehicle comprising a body, an engine mounted on said body, an elongate hydraulic master cylinder mounted on said body adjacent to the engine wherein the engine has an inclined surface facing the master cylinder for contact therewith during a frontal impact of the vehicle of sufficient severity to produce rearward displacement of the engine.
2. A motor vehicle as claimed in Claim 1 in which the inclined surface is on a deflector block attached to the engine.
3. A motor vehicle as claimed in Claim 1 or in Claim 2 in which the hydraulic master cylinder is a brake master cylinder which is deflected laterally by contact with the inclined surface.
4. A motor vehicle as claimed in Claim 1 or in Claim 2 in which the hydraulic master cylinder is a brake master cylinder which includes a vacuum reservoir, the arrangement being such that contact between said inclined surface and the master cylinder causes the master cylinder to be deflected laterally.

5. A motor vehicle as claimed in Claim 4 in which the lateral deflection of the master cylinder produces buckling of the vacuum reservoir.
6. A motor vehicle substantially as described herein with reference to the accompanying drawing.